PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
TYC04-D123TR		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/TR2004/000033	17.06.2004	17.06.2003

International Patent Classification (IPC) or national classification and IPC
F01B9/02

Applicant
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1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 29 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section.607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
22.08.2005	06.10.2005
Name and mailing address of the international preliminary examining authority:	Authorized Officer
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/TR2004/000033

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-9, 12, 13, 16, 19-21, 28-30	as originally filed
10, 11, 14, 15, 17, 18, 22-27	filed with the demand

Claims, Numbers

1-59	filed with the demand

Drawings, Sheets

1/23-15/23, 18/23, 21/23-23/23	as originally filed
16/23, 17/23, 19/23, 20/23	filed with the demand

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/TR2004/000033

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1 - 59
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1 - 59
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1 - 59
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V:

1. There is no particularly relevant prior art document available. The independent claims are delimited over the more general state of the art as described on pages 1 and 2 of the description.

2. The problem to be solved by the present invention was to enhance the operational output the known mechanisms by making accessible with non-axial circular motion the regions which directly driven axially rotating terminal units cannot reach and to simplify the construction of such mechanisms.

   This problem is solved by the combination of features set out in the independent claims, especially by the particular design of the drive transmitting element, the eccentric element and the bearing surrounding the eccentric element.

3. The present invention shall be considered to be new because no cited prior art document discloses all features of any of the independent claims in combination. The objection against novelty in view of prior art documents DE-A-25 52 258 or EP-A-0 402 967 is overcome by the amended claims.

4. The cited documents do not disclose or fairly suggest bearing means surrounding an eccentric element and the particular design of the drive transmitting element. The available prior art documents cannot give the skilled person any lead to combine all features defining the invention according to the independent claims. The objection against inventive step in view of the prior art documents cited in the search report, in particular DE-A-25 52 258 and EP-A-0 402 967 is overcome by the amended claims.

5. The invention shall be considered as susceptible of industrial application because it can be made or used in the machine tool industry.

6. Claims 2 - 24, 27 - 29, 31 - 33, 35 - 38, 40 - 42, 44, 46 - 55 and 57 - 59 are dependent on claim 1, 26, 30, 34, 39, 43, 45 or 56, respectively, and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VII:

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents DE-A-25 52 258 and EP-A-0 402 967 is not mentioned in the description, nor are these documents identified therein.

Re Item VIII:

Although claims 1, 25, 26, 30, 34, 39, 43, 45 and 56 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

spindle. Each drive transferring spindle (7) has three connection points, whereby such drive is received, supported to the frame, and such drive is transferred.

The point that such drive is received is the point that is leaned on the eccentric part close to the center of the drive transferring spindle (7). The drive transferring spindle (7) is connected to the outer support of the rotational eccentric bearing (6) so as to become essentially vertical with respect to the bearing's axis or this bearing is manufactured on the tip of this spindle (7) as an integral part. Center A of the circular motion is on the axis (A) of the main drive spindle (4).

A drive transferring spindle bearing (9) is provided where said drive transferring shaft (7) is slid axially and this bearing (9) is included in a support piece (10) of which both ends are connected to the frame by one apiece rotational bearings (11) having parallel axes with respect to the main drive spindle (4). When the drive transferring spindle bearing (9) preferably in a straight form is also movable, the support piece is fastened by both ends to the frame. Thus when the drive transferring spindle (7) moves axially within this drive transferring spindle bearing (9), it also moves circularly. The rotational bearing center (B) of the support piece is the supportive point (B) of the drive transferring spindle.

The drive transferring spindle (7) is connectable in a radial manner to the outer support of the final spindle bearing of the final spindle rotational bearing (12) or this bearing is manufactured on the tip of this bar as an integral part and the central point (C) of this bearing, is the point C where the drive is transferred. The final transferring spindle (8) is connected to the inner surface (14) of this bearing (12). This connection point can be optionally connected to the final drive spindle (8) also without the use of a bearing. In all cases, it is the point D on the final spindle where the drive is transferred. The point (F) where the drive is transferred shall be the end of the final drive spindle (8) that is far from the main frame (2) and a connection part with a stable or rocker bearing (15) is provided there where workpieces can be assembled. The end (E) of the final drive spindle (8) that is close to the main frame is point E and a rocker bearing (16) is provided there that connects the spindle (8) to the main frame (2).

In group 2 figures, different operative modes are disclosed for the drive transferring spindle (7). Three movement points of the drive transferring spindle are pictured in Figure 2b. It is only possible to transfer the rotational motion received on point A to point C in the same style and scale, if point B is exactly on the middle of points A and C. But it is also possible to transfer the rotational motion on point A to point C in an elliptical style. When the support center is closer to point A as compared to point C (Figure 2c), an elliptical motion is obtained that has the vertical diameter larger on point C as compared to point A in the direction of the drive transfer, and when the support center is closer to point C as compared to point A (Figure 2d), an elliptical motion is obtained that has the vertical diameter smaller on point C as compared to point A in the direction of such drive transfer. The diameter on the same direction is kept constant as twice the distance of the eccentric part's axis and the main spindle's axis.

In group 3 figures, various operative modes of the final spindle are disclosed. The end of the final drive spindle close to the main frame is selected as the support point and the related connections are marked (Figure 3a). However, the final drive spindle's end that is close to the main frame as the drive receiving point can be selected as the support point in a region between the two ends of the final drive spindle by reversing the point where the drive is received with the support point and the end far from the frame can also be used as the point where such drive is transferred. Different operative modes can be obtained by reversing the support points and the points where drive is received, by embodying the connection points on these points movably or stably, and by using multiple secondary drive bars. When a rocker bearing is used, one point of the bar is to be fastened jointly to the frame. In such circumstance, the final drive spindle (8) (figures 3a and 3b) follows the outer surface of the circular-elliptic conic. When point E becomes the lower end (Figure 3b) or the middle end of the bar (Figure 3b), point F repeats the motion of point D by making it larger in proportion with the distances to point E.

When alternatively the point D where the drive is received is embodied stably or straightly sliding without axial rotation (Figure 3d), the drive received from this point is equally transferred to the end point F and point E of the final drive spindle. In this case will point E also be movable. In order to meet lateral and vertical loads

In an alternative embodiment in Figure 9, the supporting (31) bearing and the final spindle rotating bearing (12) where such drive is received are embodied with straight sliding bearings and the terminal of a linear actuator (30) shaft (32) is connected to a region close to point F of the final drive spindle within these bearings. This actuator is connected to the supporting (31) bearing from the lower part (33) of its frame. By moving the actuator spindle on the x axis, the final drive spindle (8) shall too move on the z axis. When the straight actuators moving the drive shafts on the z axis are fed with air pressure, the pressure intensity applied to work pieces can be adjusted by controlling the air pressure driving such actuators. By connecting in common the air transfer lines with other actuators, they are moved in common or by employing a pushing spring (8) as seen in Figure 10 in place of the linear actuator, the final drive spindle (8) is pushed with a fixed pressing force.

As seen in Figure 11, by lengthening the connection element (34) whereby the drive is transferred from point C of the drive transferring spindle (1) to point D of the final drive spindle (8) and by fastening a multiple final drive spindle (8) to rocker bearings (16), the capacity in increased. Also the frame element (2) is lengthened where the movable supporting bearings of final drive spindles (8) are assembled and is positioned parallel to the connection element to form a group. By connecting another group (37) to such capacity-enhanced group by means of group joints (38), a group is operated different on the z axis with respect to an adjacent group. Between the support of the extra group (37) far from the frame and the frame (2) is provided a shaft (40) connected with straight bearings and bar joint (39). The bearings of the connection shaft must be constructed so that to allow this shaft to move on the z axis, but not permit to change its projection direction on the xy plane. By a linear actuator (30) to be connected to a proper region of the frame and support piece or connection element, the extra group (37) is moved on the z axis. When such straight actuators are operated with pressurized air, the pressure intensity applied to workpieces can be adjusted by controlling the pressure of the air driving these actuators. By synchronizing such applied air transmission lines with the other actuators, they can be driven in common.

When the bearings on points E and D are jointed, the center of the movement at point F is dynamically altered by moving the bearing at point E in the primary drive spindle's direction and not on the lateral direction. By moving bearing E on the z axis, the movement on point F is dynamically made larger or smaller.

The center of the movement at point F can be simultaneously altered at both centers by assembling the E bearing to one end of a drive spindle of which the other end is supported by the frame, and by moving this spindle from its middle points on the z axis. These connection spindle and bearings must be constructed so that they shall permit this spindle to move on the z axis, but not permit to change its projection direction on the xy plane. The movement of this spindle on the z axis can be realized by a linear actuator or be moved in proportion of the distance to the work piece with a piece contacting thereto.

It is possible to connect the operative terminal units by means of fixed or jointed bearings at the terminal of the final drive spindles (8) at point F. The adaptor support (41) where the operative terminal units can be connected to, as seen in Figure 12, is connected to the end of the final drive spindle (8) with a jointed bearing (42), and thus the operative part can be positioned parallel to the surface of the work piece. In order to prevent the adaptor support from rotating relative to the spindle's center, this adaptor support is assembled to a key channel (43) or threads embodied on the terminal of the final drive spindle (8), as demonstrated in Figure 13.

Regarding Figure 14, both features are formed in a different embodiment. The final drive spindle (8) can rotate in the straight bearings (44) at rocker bearings (16), which are fastened for the movement on the z axis and whereby the drive is received (D) and the spindle is supported. When the rotation is prevented by connecting spindle rotation bearing (12) to the drive transferring spindle (7) and connecting rocker bearing (16) to the main frame (2), jointed bearings (42) are arranged to F1 and F2 points. The adapter piece (41) is assembled to these bearings. Thus the rotation of an operative piece around the final drive spindle (8) is prevented. By adjusting both drive spindles at different elevations relative to

Such employed rocker bearings can be structured so that it prevents the transferring loss of the movement, but allows axial moments by stretching/twisting.

Regarding all alternative embodiments of the present invention as described hereinabove, the present mechanism is assembled to frames of other processing systems or to movable elements connected to such systems, and thus the automatic controls required during by the workpiece during operation is provided by other control units. The automatic control options of these control units based on data received from the present mechanism are given hereunder.

The angular positions of the main drive spindle or main drive motor are transmitted to the mechanism controlling units by means of pint or proportional sensors, and the proper automatic control function is applied.

When an electromotor is used as a drive motor, a signal proportional to consumed energy is transmitted to the control units by such sensors, and the pressure exerted on processed pieces by the working pieces are controlled by applying automatic control function on the drive actuator on the z axis.

The control of pressure on processed pieces can also be performed either by transmitting the linear position of actuators by point (head-center1-center2-end) or proportional sensors to the control unit, or by transmitting their position on the course (head-center1-center2-end) by point or proportional sensors to the control unit.

Automatic control is applied on the forces the terminal units are exposed to by means of stress sensors to be positioned to supporting points.

By connecting vibration sensors to be attached to required positions to the control units, a smooth operation is provided as a result of eliminating vibrations on the resonance frequencies by means of the automatic control to be applied to the main drive spindle or a constant speed operation is performed at resonance free region.

When this mechanism is operated by rotating around itself as a result of connecting this mechanism's frame to the main frame with rotating coupling

elements, sensors, actuators, and fluid transferring hoses must be connected with tolerances between two such frames with a protective armor, the rotation angle must be restricted with the connecting bearings or the number of rotations must be controlled by the control unit.

The flow of external fluids transferred to this mechanism is controlled by external control units.

Figure 19 gives a perspective view of a preferred embodiment mechanism comprising the double-plate multi final drive spindle under the present invention. Accordingly, two D points (D1-D4) are formed on a primary plate (53) and two primary drive transferring shafts (57, 58) are connected there at points C, the latter (57, 58) being driven by the same axially rotating shaft as the primary rotating bearings (55, 56). The positions of this drive transferring shafts on points A and B are calculated so that the diameters of ellipsoid movements to be transferred from such shafts to C points are identical, and their rotation angles synchronized. The movements of the eccentric bearing structures on points A and of the movable sliding bearing structures on points B on the Z axis must be kept restricted.

Two D points (D3-D2) are formed on a secondary (54) plate and two secondary drive transferring shafts (61, 62) are connected there at points C, the latter (61, 62) being driven by the same axially rotating shaft as the secondary rotating bearings (59, 60); and the ellipsoid movement on points A of these drive transferring shafts is received from a different axially rotating shaft as compared to the first one.

There are provided rocker bearings (63, 64) assembled to equivalent points on x and y axes of the primary and secondary plates (53, 54) and final drive spindles (65) connected to each of them on the z axis. While these rocker bearings (63, 64) can be structured so as to permit the axial rotation of the final drive shafts (65), they can also be produced from a flexible material such as rubber. Such flexible structure, however, does not permit movement losses on x and y axes.

By positioning primary and secondary plates (53, 54) apart on z axis, D and E points are obtained on final shafts. Since the ellipsoid movement's diameter and velocity formed at point A where the primary plate (53) is connected is different

Regarding another method to obtain a different ellipsoid movement at point F, either with or without mechanical position sensors, as seen in Figure 27, one of such drive plates (54) is fixed to the frame or the other (53) is connected to this plate with ellipsoid rotating bearings (66). The connection support (78) of actuators at the point of coupling is connected to the other drive plate (53). In the control application in this method, however, the total of both movements must be applied by a single control system.

If there is not a flexible connection element present in ellipsoid bearings (66), a forth and back movement is obtained on the orbit that is permitted by the bearings without a second ellipsoid motion formed (Figure 28a). The number and size of this second movement is determined by the control units.

When the connection support connecting the ellipsoid bearings (66) to the drive plate (53) or some of the structural elements within itself are flexible, a second ellipsoid movement (Figure 28b) becomes available in a degree determined or permitted by this flexible element, such movement being different from the first (as seen in Figure 28a). This limit of such second ellipsoid movements shall be greater/on the rotation trace/diameter of the ellipsoid bearing, as permitted by the flexible connection element in the bearing.

When one of such drive plates is fixed to the frame with a connection support (83) and with the common connection supports (78) of actuator groups as seen in Figure 29, an ellipsoid movement is obtained within the limits of rocker bearings (84) and actuators, provided that the other drive plate is connected to the former plate by means of rocker bearings (84) to be assembled between such plates without the use of ellipsoid rotation bearings. Two or more equivalent actuator groups are assembled between such drive plates to provide the ellipsoid movement equal on the whole surface of the plate; so are they moved equally by the same control element. Therefore, by applying an equal ellipsoid movement simultaneously on two different points of such drive plates, the same ellipsoid movement is obtained on the entire regions of the plate.

Ellipsoidal motion combinations of the plate are obtained within the limits of the rocker bearings (84) and the actuators in compliance with the preordered and sampled of the control system.

If position sensors to be positioned independently on x and y axis of the plates between such plates shall transmit data to the control system, the position of the drive plate is continuously controlled by the control system.

In order to absorb the centrifugal affects that such drive plates (53, 54) shall possibly create on the frame, fluid connections of actuators on the drive plates to be connected to the frame are reversed with respect to each other.

In case the driven plates (53,54), excluding the parts of frame and the primary drive spindle, are structured to move in XY axes and flexible in Z axis, active or passive pushing or pulling means are connected to those parts of the plates so that pressure is controlled in Z axis.

If the centers of rocker bearings on x y axis on the final drive spindles are shifted on the x y axis relative to the other plate, the positions of F points on the final drive spindles to be assembled to these bearings, are brought to the x y axis proportional to the distance from the center of the rocker bearings in plates. The workpiece is applied drives with different slopes (crossing from radial contact to axial contact) by final drive spindles positioned in this manner. By coordinating or offsetting the rocker bearings' center so that to conform the slope of the drive plates on the z axis to the surface form of workpieces, the movement limits of rocker bearings and the movements of drive plates on the z axis are operated optimally. While such drive plates leans to the z axis, the position of the final spindle alters at these rocker bearings and when the slope is increased, no field is left for an ellipsoid movement as the bearings reach their limits, thus once a predetermined slope is given to the drive plates, the bearings' XY positions are arranged proportional with this predetermined slope.

When the frame couplings are performed by positioning eccentric bearings in the internal surfaces of primary and secondary drive plates, the coupling between the drive plates and the frame becomes T shaped and the plates form the upper part

of such "T". The regions of primary and secondary drive plates on the outer surfaces are not restricted. When the final drive spindles are positioned within rocker bearings so as the lengths of such final drive spindles out of the drive plates are equalized and F points are formed on each drive plate, two F points are obtained on each final spindle and thus it becomes possible to make simultaneous operations on double surfaces or the operative terminal units are spared.

Whilst there are a number of application fields where such movement and control methods are employed, the following vehicle brushing units shall be disclosed hereunder as a preferred embodiment of the present invention.

The drive plates are preferably selected among flexible materials for such a cleaning oriented application under the present mechanism and such mechanism must be constructed so as to deliver fluids required for such cleaning purposes.

Such drives plates (87) embodied preferably from thermoplastic material compose elements with coatings on both surfaces with rubber/polyurethane elastomer based materials (85, 86) –these coatings function as supports at the same time- and fluid transferring channels thereon. The rocker bearings where the final drive spindles are to be assembled are embodied on the drive plate. Regarding such rocker bearing, there are provided a fluid passage orifice (8) on the central drive plate (87), one apiece flexible bearing with common centers on the surface coating of this drive plate (87), and spacers (90, 91) between such both surface coating (85, 86), having a longitudinal orifice opened on the center and cylindrical surface (on the radial direction), with the edges beveled and functioning as an internal support and fluid transferring element. Although these spacers can appear as a part of the drive plates, they are a part of the final drive spindle. On one spacer (90) on the lower and upper rocker bearings, an extra orifice is formed for the fluid transferring channel.

The final motion bar is composed of a combination of parts. It is composed on one end, an upper adapter (92) with a beveled corner facing the plate having a lock like cavity where cleaning brushes are to be attached and at the continuance of this cavity, an interior cavity where the spindle is to be attached; an punctured pipe (93) with a flexible structure having various orifices to transmit liquid to the brushes

and a cylindrical bearing (94) where such pipe is assembled; a pushing spring (95) within such cylindrical bearing and a spherical valve (96) that said spring pushes; a shaft (97) with a chamfer at the tip, which is integrated into this cylindrical bearing, of which the interior is bored so as to open to the orifice in the punctured spacer on the primary drive plate, and which has a length reaching the lower plate at the end of the secondary plate; a spacer (90) with both edges beveled and having fluid transfer orifices in the rocker bearing; a supporting piece (98) with both edges beveled and positioned between the plates where this shaft (97) passes; a spacer (91) with both edges beveled within the secondary rocker bearing; and fastening element (99) tightening and fastening the whole structure and having a beveled edge against the plate. The brushing group, which is locked to the upper adapter in a detachable manner and, which is in a thermoplastic, fiber, sponge, etc. form, is a part of this final bar group. Circular cavities and projections are embodied on the surfaces of the upper adapter and intermediary supporting pieces contacting the polyurethane elastomer/rubber materials on the surfaces of the drive plates so as to tightly clutch them and prevent any slippage and liquid material leakage therefrom. The inner diameters of circular cavities (88) of supporting plates making up the rocker bearings in drive plates and the outer diameters of the upper adapter (92) and the fastening piece (99) and other spacers (90, 91, 98) are proportioned so as to provide an ellipsoid motion and not to exceed the motion limits of rubber/polyurethane elastomer materials at the same time. The liquid provided by means of the channel in the drive plate (100) reaches directly the brush groups by means of the orifices on the pipe after passing through the valve mechanism that opens the fluid way at a certain pressure by means of the spacer. As a result of the tight contact of the brush elements to be assembled to the upper adapter's fastening piece to the body of the flexible fluid transferring pipe or as a result of assembling such brushes directly to such fluid transferring pipe, the losses in the ellipsoid motion to be transferred to the brushes at the foremost tips are reduced. The pipe, however, must be structured so that it shall not scratch the vehicle's surface when the pipe is left without a brush or it must be embodied with materials (felt, sponge, etc.) that shall not scratch such surface. When the ellipsoid motion of the drive plates is movable between such plates or not restricted at the ellipsoid bearings, the upper adapter

or the spacers are made contact the drive plate by enlarging their diameters on their outer diameters at a certain distance from the drive plate in order to the restrict the diameter of the ellipsoid motion. This restriction processes can also be realized by adding rocker bearing with restricted movements to various zones between the primary and secondary plates.

According to an alternative embodiment of the present invention, when said final motion spindle composed of a number of parts as indicated above is embodied in an integrated form so as to incorporate the spacers in plates and the double layer flexible bearings made up from flexible rubber-polyurethane elastomer material at the drive plates, it becomes adequate that such flexible bearing material is single layered for each drive plate. As a result of arranging the positions of such flexible bearing at the Z axis of the final bar proportionally to the primary and secondary drive plates, it becomes adequate to fasten them to the drive plates with washer like materials. When one section layer of the primary and secondary drive plates of these flexible bearings are manufactured in an integrated manner so as to incorporate the supporting piece (98) on the primary plate (85) and other plate (85), it becomes possible to assemble the final bar to the drive plates with washer like materials and fasten to such integrated bearings by means of a fastening piece or to assemble it tightly into the orifice in the integrated bearings so as to provide the related fluid transfer to the part before such valve by means of flexible hoses. It is also possible to form each fluid transferring group independently on a single drive plate or to make them contact the main supporting hoses by means of transferring hoses without using such drive plates. In this condition, an annular rubber/polyurethane elastomer based material with an orifice in the center can be attached to a single surface of drive plates or between two plates to form a single drive plate and thus an rocker bearing can be obtained by fastening them together with washers of suitable diameter, such washer having screwing orifices on both of its surfaces and bored at the center.

A spraying nipple is formed and contacted to such plates in order to deliver a second fluid to a surface to be cleaned. It is composed of a punctured piece (101) with a punctured piece at the tip and a cylindrical bearing (102) to assemble such piece; a pushing spring (103) within the cylindrical bearing and a spherical valve

(104) that said spring pushes; a shaft (105) with a chamfer at the tip, having at the interior a hole which is open to the orifice at the punctured spacer at the secondary drive plate integrated to this cylindrical bearing and of which the length reaches the lower piece at the end of the secondary plate; a spacer (106) with both edges beveled having fluid transferring orifice within the rocker bearing where such shaft is passed; and a fastening element (107) of which the edge facing the plate is beveled and which tightens the whole structure and fastens it to rocker bearing. The liquid provided by means of the channel in the drive plate (108) reaches directly the vehicle's surface by means of the orifice at the nipple after passing through the valve mechanism that opens the fluid way at a certain pressure by means of the fluid spacer.

The passage orifice at the primary drive plate where this cylinder passes has a diameter so that the plate does not contact the cylinder during the ellipsoid motion. The orifice at rubber/polyurethane elastomer materials of both faces of the primary drive plate may differ according to purposes. When an ellipsoid motion is applied to the cylinder, it must have a diameter to contact the cylinder. The sizes of these spraying elements with a cylindrical structure must have the size and coordinates that allow them to pass through the primary drive plate and spray a surface with liquid from the intermediary spaces of the brushes.

The fluid transfer is realized by taking the fluid from other control elements with a flexible hose connection and by delivering it to the fluid transferring channels at primary and secondary drive plates.

In order to prevent such fluid from drain from such channels at the end of an operation, spherical valves with pushing springs are mounted on each fluid outlet part. This stopping mechanism opens only if pressurized fluid is applied to the channels to provide such fluid flow.

A brush embodied under these conditions is given in Figure 31. The larger ellipsoid motion on the brush allows the brush on smooth or groovy surfaces to be cleaned, whereas the other smaller, but faster ellipsoid motion allows a relatively more efficient cleaning to be made. When the larger ellipsoid motion or both motions are realized by means of fluid actuators, a relatively more efficient is

CLAIMS

1. A mechanism comprising a main drive spindle (4) being driven by a power supply and rotatable axially ; at least one eccentric element (1) being in communication with said drive spindle (4) and producing eccentric motion; characterized by comprising at least one bearing means (5) surrounding the eccentric element (1); and at least one drive transmitting element (7) being configured to perform an essentially linear movement which is transformed into an orbiting motion of the final drive spindle, one of the terminals of the drive transmitting element (7) being connected to said eccentric bearing means (5) and the other terminal to a final drive spindle (8), the drive transmitting element (7) passing through a drive transferring spindle bearing (9) associated with a supporting piece (10) connected by bearings (11) to the main frame (2).

2. A mechanism according to Claim 1, characterized by comprising at least one final spindle bearing (12) connected to said final drive spindle (8) and said drive transferring element (7).

3. A mechanism according to any of the foregoing claims, comprising a terminal unit characterized by comprising a bearing means (15) supporting the terminal unit to be operative at the other end of said final drive spindle (8).

4. A mechanism according to any of the foregoing claims, characterized by comprising a rocker bearing (16) providing the connection of the final drive spindle (8) to the main frame (2).

5. A mechanism according to any of claims 1, characterized in that a bearing is provided that is fixed to the main frame at a lower or upper side of the final spindle bearing (12), respectively, when the final spindle bearing (12)

is positioned to a point close to the upper or lower end of said final spindle (8).

6. A mechanism according to any of the foregoing claims, characterized by comprising a spring (18) provided on the lower side of said supporting piece (10) and a supporting piece (17) surrounding such spring (18) so that said final drive spindle (8) can displace on the axial direction.

7. A mechanism according to claims 1 and 6, characterized in that said bearing means (5) can rotate on the radial direction with respect to the longitudinal axis of said main drive spindle (4).

8. A mechanism according to any of the foregoing claims, characterized by comprising a bearing lower end (20) with a spherical formation provided on the lower end of said final drive spindle (8), and a sloped platform (21) provided in a rotating manner on the main frame (2), the platform (21) being in contact with said lower end (2) so that said final drive spindle (8) can displace on the axial direction.

9. A mechanism according to Claim 8, characterized by comprising a support (22) being supported with springs (18), and the support (22) being fixed to the spherically formed bearing lower end (20).

10. A mechanism according to claims 8 and 9, characterized by comprising a final spindle joint (19) provided between said support (22) and said final drive spindle (8).

11. A mechanism according to Claim 8, characterized by comprising a spring (18) provided on the lower region of a straight sliding bearing (25) carrying said final drive spindle (8).

12. A mechanism according to any of the foregoing claims, characterized by comprising a flexible tube means (27) provided on the lower side of said

final drive spindle (8) and an air inlet (29) is provided for supplying air to said tube means (27) so that said final drive spindle (8) can displace on the axial direction.

13. A mechanism according to any of the foregoing claims, characterized by comprising an actuator means (30) positioned on the lower part of said final drive spindle (8) so that said final drive spindle (8) can displace on the axial direction.

14. A mechanism according to any of the foregoing claims ; characterized by comprising an actuator means (30) connected to a support (31) with one end supporting said final drive spindle (8) so that the latter (8) can displace on the axial direction.

15. A mechanism according to any of the foregoing claims, characterized by comprising a connection element (34) driven by the drive transferring spindle (7), the final drive spindle (8) is provided by rocker bearings (16) onto the connection element (34) for forming a group; and a group joint (38) connected to the connection element (34) for connecting a secondary group to the group, and the final drive spindle being also supported by rocker bearings (16) to the piece lengthened from the frame element (2).

16. A mechanism according to Claim 15, characterized by comprising a bar joint (39), a bar (40), and an actuator means (30) driving this bar (40), said bar joint (39) being connected to the connection element (34) of said secondary group (37) so that said secondary group (37) can rotate around the group joint (38).

17. A mechanism according to any of the foregoing claims, characterized by comprising an adapter support (41) connected to the terminal unit bearing (15).

18. A mechanism according to Claim 17, characterized in that said adapter support (41) comprises key channels (43) or threads providing the connection of the former (41) to said final drive spindle (8).

19. A mechanism according to any of the foregoing claims, characterized in that the mechanism is driven by a single drive transferring spindle (7), when said final drive spindle (8) is provided multiply.

20. A mechanism according to Claim 1, characterized by comprising multiple eccentric elements (1) connected to said main drive spindle (4), multiple drive transferring spindles (7) connected to this eccentric elements (1), and multiple final drive spindles (8) connected to such spindles.

21. A mechanism according to any of the foregoing claims, characterized by comprising a threading group (47) positioned on the lowest position of said main drive spindle (4).

22. A mechanism according to any of the foregoing claims, characterized by comprising piping means (51) to provide fluid to said terminal unit bearing.

23. A mechanism according to Claim 22, characterized by comprising openings (52) embodied to enter said piping means (51) into said adapter support (41).

24. A mechanism according to Claim 1, characterized in that the mechanism is applicable for a group consisting of cleaning means, soil processing means, construction means, solid and fluid material orienting means.

25. A method for producing orbiting movement, comprising the steps of - rotating an axially rotating main drive spindle (4), characterized by the following steps of - converting the axial rotation into an eccentric motion by means of an eccentric element (1) connected to this main drive spindle (4), - converting the eccentric motion essentially to linear motion by means of a

drive transferring spindle (7) connected to one end of said eccentric element, and - transferring the linear motion to the final drive spindle (8) connected to the other end of said drive transferring spindle (7) and thus orbiting this drive spindle (8), wherein the drive transmitting element (7) passing through a drive transferring spindle bearing (9) associated with a supporting piece (10) connected by bearings (11) to the main frame (2), whereby the final drive spindle (8) produces orbiting movement.

26. A mechanism comprising a main drive spindle (4) being driven by a power supply and rotatable axially ; at least one eccentric element (1) being in communication with the main drive spindle (4) and producing eccentric motion; characterized by comprising at least one bearing means (5) surrounding the eccentric element (1); at least one primary drive transferring element (7) being configured to perform an essentially linear movement, one of the terminals of the drive transmitting element (7) being connected to the eccentric bearing means (5) and the other terminal to a primary plate (53), the drive transmitting element (7) passing through a drive transferring spindle bearing (9) associated with a supporting piece (10) connected by bearings (11) to the main frame (2), the linear movement of the primary drive transferring element (7) is transformed into an orbiting motion of the primary plate (53), and at least one secondary drive transferring element being configured to perform an essentially linear movement, connected to a secondary plate (54) the linear movement of the secondary drive transferring element (7) is transformed into an orbiting motion of the secondary plate (54), and at least one final drive spindle (65) which is supported by the primary plate (53) and the secondary plate (54) in a movable or flexible manner (63, 64), and said secondary plate (54) whereby the final drive spindle (8) produces orbiting movement.

27. A mechanism according to claim 26, characterized in that drive transferring shafts (57, 58) connected to the primary plate (53) are driven by the same

axially rotating shaft, the drive transferring shafts (57, 58) transferring identical ellipsoid movements to the primary plate (53), and secondary drive transferring shafts (61, 62) connected to the secondary plate (54) are driven by the same axially rotating shaft, the drive transferring shafts (61, 62) transferring identical ellipsoid movements to the primary plate (53).

28. A mechanism according to Claim 26, characterized in that the movable or flexible support is achieved by rocker bearings (63,64) comprised by said primary (53) and secondary plate (54) and supporting each said final drive spindle.

29. A mechanism according to Claim 26, characterized in that said at least one final drive spindle is driven by both the primary plate (53) and the secondary plate (54).

30. A mechanism comprising a main drive spindle being driven by a power supply and being rotatable axially ; at least one eccentric element, being in communication with the main drive spindle and producing eccentric motion; characterized by comprising at least one bearing means surrounding the eccentric element; at least one primary drive transferring element being configured to perform an essentially linear movement, one of the terminals of the drive transferring element being connected to the bearing means and the other terminal to a primary plate (53), the drive transmitting element (7) passing through a drive transferring spindle bearing (9) associated with a supporting piece (10) connected by bearings (11) to the main frame (2), the linear movement is transformed into an orbiting motion of the primary plate (53), and one axially rotating bearing (73) connected to a secondary plate (54) and to the main frame; at least one ellipsoid bearing (66,67) connected to said secondary plate (54) and to the main frame; and at least one final drive spindle (65) supported by the primary plate (53) and the secondary

plate (54) in a movable or flexible manner (63, 64), and said secondary plate (54), whereby the final drive spindle produces orbiting movement.

31. A mechanism according to claim 30, characterized in that drive transferring shafts (57, 58) connected to the primary plate (53) are driven by the same axially rotating shaft , the drive transferring shafts (57, 58) transferring identical ellipsoid movements to the primary plate (53).

32. A mechanism according to Claim 30, characterized in that said at least one ellipsoid bearing (66,67) comprises a spindle (68), a bearing (69) rotating on the spindle, an eccentric spacer (70) positioned externally to the bearing, a rotating bearing (71) positioned externally to the spacer, and a connection support (72) being positioned externally to the rotating bearing and connected to the main frame.

33. A mechanism according to Claim 30, characterized in that said axially rotating bearing (73) comprises a drive transferring spindle (76) connected to an actuator, an eccentric spacer (77) connected to the spindle, a rotating bearing (75) positioned externally to the spacer, and a support (74) connected to the drive plate.

34. A mechanism comprising a main drive spindle being driven by a power supply and being rotatable axially ; at least one eccentric element being in communication with the main drive spindle and producing eccentric motion; characterized by comprising at least one bearing means surrounding the eccentric element; at least one primary drive transferring element being configured to perform an essentially linear movement, one terminal of the drive transferring element being connected to the bearing means and the other terminal to a primary plate (53), the drive transmitting element (7) passing through a drive transferring spindle bearing (9) associated with a supporting piece (10) connected by bearings (11) to the main frame (2), the linear movement is transformed into an orbiting motion of the primary plate

(53), and at least one support (78) being connected to a secondary plate (54) and to the main frame by means of a number of actuators (79,80, 81,82) ; at least one ellipsoid bearing (66,67) connected to the secondary plate (54) and to the main frame, and at least one final drive spindle (65) supported by the primary plate (53) and the secondary plate (54) in a movable or flexible manner (63, 64), and said secondary plate (54), whereby the final drive spindle produces orbiting movement.

35. A mechanism according to Claim 34, characterized in that said actuators (79, 80, 81,82) are driven by single or double impacted linear or fluid pressure.

36. A mechanism according to any of claims 34 or 35, characterized in that when said actuators are driven by fluid pressure, the fluid pressure and fluid amounts fed to the actuators are controlled by control elements featuring on/off or proportional control.

37. A mechanism according to any of the claims 34 to 36, characterized by comprising point or proportional sensors positioned on the actuators or the frame to provide said control elements with control data.

38. A mechanism according to Claim 34, characterized in that said at least one ellipsoid bearing (66,67) comprises a spindle (68), a bearing (69) rotating on the spindle, one eccentric spacer (70) positioned externally to the bearing, a rotating bearing (71) positioned externally to the spacer, and one connection support (72) being positioned externally to the rotating bearing and is connected to the main frame.

39. A mechanism comprising a main drive spindle being driven by a power supply and rotatable axially ; at least one eccentric element being in communication with the main drive spindle and for producing eccentric motion; characterized by comprising at least one bearing means

surrounding the eccentric element; a primary plate (53), at least one support (78) connected to a second plate (54), which being connected to the main frame, the mechanism being driven by means of a number of actuators (79,80, 81,82); at least one ellipsoid bearing (66) connected to the main frame and providing the connection of said secondary plate (54) and said primary plate (53), and at least one final drive spindle (65) supported by the primary plate (53) and the secondary plate (54) in a flexible or movable manner (63, 64) by said primary plate (53) and said secondary plate (54), whereby the final drive spindle produces orbiting movement.

40. A mechanism according to Claim 39, characterized in that said actuators (79,80, 81,82) are driven by means of a single or double impacted linear or fluid pressure.

41. A mechanism according to one of claims 39 or 40, characterized in that when said actuators are driven with fluid pressure, the fluid pressure and fluid amounts fed to the actuators are controlled by control elements featuring on/off or proportional control.

42. A mechanism according to claim 41, characterized by comprising point or proportional sensors positioned on the actuators or the frame to provide said control elements with control data.

43. A mechanism comprising a main drive spindle being driven by a power supply and rotatable axially ; at least one eccentric element being in communication with the main drive spindle and for producing eccentric motion; characterized by comprising at least one bearing means surrounding the eccentric element; a primary plate (53) connected to the main frame, at least one support (78) connected to the main frame, the mechanism being driven by means of a number of actuators (79,80, 81,82); at least one rocker bearing (84) providing the connection of said secondary plate (54) and said primary plate (53), the support (83) connected to the

main frame, and at least one final drive spindle (65), which is supported in a flexible or movable fashion by said primary plate (53) and said secondary plate (54), whereby the final drive spindle (65) produces plurality of motion combinations.

44. A mechanism according to claim 43, characterized by comprising point or proportional sensors positioned on the actuators or the frame to provide said control elements with control data.

45. An application of a mechanism according to any of the claims 26 to 44 to brushing units for cleaning purpose, characterized by comprising plates (53, 54) produced preferably from thermoplastic material (87) coated preferably with elastomer coatings (85,86) having supporting functions, holes (88) provided on said movable plates for rocker bearings, and a supporting piece (98) provided within the holes (88), and positioned between said drive plates (87).

46. An application of a mechanism according to claim 45 to brushing units for cleaning purpose, characterized by comprising a spindle (97) passing through the openings provided along said drive plates (53,54), said spacers (90, 91), and said supporting piece (98) and accommodating at its tip a cylindrical bearing (94).

47. An application of a mechanism according to any of the claims 45 to 46 to brushing units for cleaning purpose, characterized by comprising a channel (100) provided along the vertical axis of said primary drive plate (53) up to the hole (88), another hole provided to said spacer (90), and an space having a"T"shape and the space being provided in the spindle (97)

48. An application of a mechanism according to any of the claims 45 to 47 to brushing units for "cleaning purpose, characterized in that the cylindrical bearing (94) where the end of said"T"shaped opening is extending

comprises a spring (95) and a spherical valve (96) in communication with this spring.

49. An application of a mechanism according to any of the claims 45 to 48 to brushing units for cleaning purpose, characterized by comprising an upper adapter (92) accommodating said cylindrical bearing (94) and a flexible pipe (93) positioned on the extremity of said cylindrical bearing.

50. An application of a mechanism according to any of the claims 45 to 49 to brushing units for cleaning purpose, characterized by comprising an additional fluid supplying element.

51. An application of a mechanism according to any of the claims 45 to 50 to brushing units for cleaning purpose, characterized in that said fluid supplying element comprises a spindle (105), a cylindrical bearing (103) positioned on the terminal of this spindle, a spherical valve (104) positioned within this cylindrical bearing, and a spring (103) that this valve is connected to.

52. An application of a mechanism according to any of the claims 45 to 51 to brushing units for cleaning purpose, characterized in that it comprises a liquid spraying piece (101) provided on the terminal of said cylindrical bearing (103).

53. An application of a mechanism according to any of the claims 45 to 52 to brushing units for cleaning purpose, characterized in that after a cleaning operation is performed, fiber-felt like elements are employed in place of such brushes in order to dry cleaned surfaces and in that fluids remaining on such surface are vacuumed by a vacuum pump in connection with such elements.

54. An application of a mechanism according to any of the claims 45 to 53 to brushing units for cleaning purpose, characterized in that said fiber-felt like elements are fibrous capable to transfer fluid towards said flexible pipe (93).

55. An application of a mechanism according to any of the claims 45 to 54 to brushing units for cleaning purpose, characterized in that a hot air blower is employed in place of said vacuum pump and that heat-resistant fiber-felt like elements are positioned in place of such brushes in order to polish such cleaned surface.

56. An application of a mechanism according to any of the claims 26 to 44 to brushing units for cleaning purpose, characterized in that said plates (53, 54) are produced preferably from thermoplastic material (87) coated with elastomer coatings (85,86) for supporting purposes so as to define an integrated structure and comprises a support piece (98), which is provided within the holes (88) opening into said drive plates for flexible bearings and provided between said drive plates (87).

57. An application of a mechanism according to claim 56 to brushing units for cleaning purpose, characterized in that a layer of the parts of said flexible bearings at primary and secondary plates (87) are assembled with washer like materials to the drive plates ; thus the final spindle is fixed to the integrated bearings by means of a fixation element or assembled into a hole within the integrated bearings in a tight-engaging manner; and flexible hoses are provided for fluid transfer to a point before such valve for cleaning purposes.

58. An application of a mechanism according to any of the claims 56 to 57 to brushing units for cleaning purpose, characterized in that for cleaning, said each of such fluid transferring groups are independently formed at a single drive plate or connected to the related main carrier hoses by means of transferring hoses without using such drive plates.

59. An application of a mechanism according to any of the claims 56 to 58 to brushing units for cleaning purpose, characterized in that an annular rubber/polyurethane elastomer based material with a hole at the center is fastened to the single surfaces of drive plates (87) or between two plates forming a drive plate and thus a rocker bearing is obtained by tightening them with proper-diameter washers with a hole in the center and screwing holes on both surfaces.

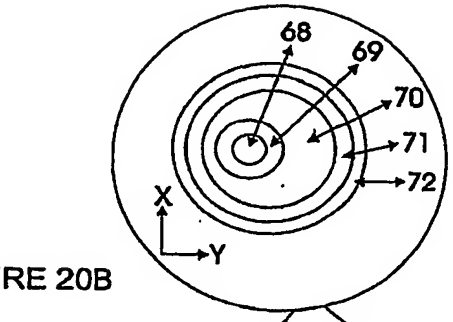

FIGURE 20B

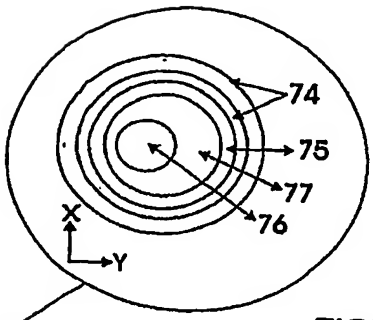

FIGURE 20C

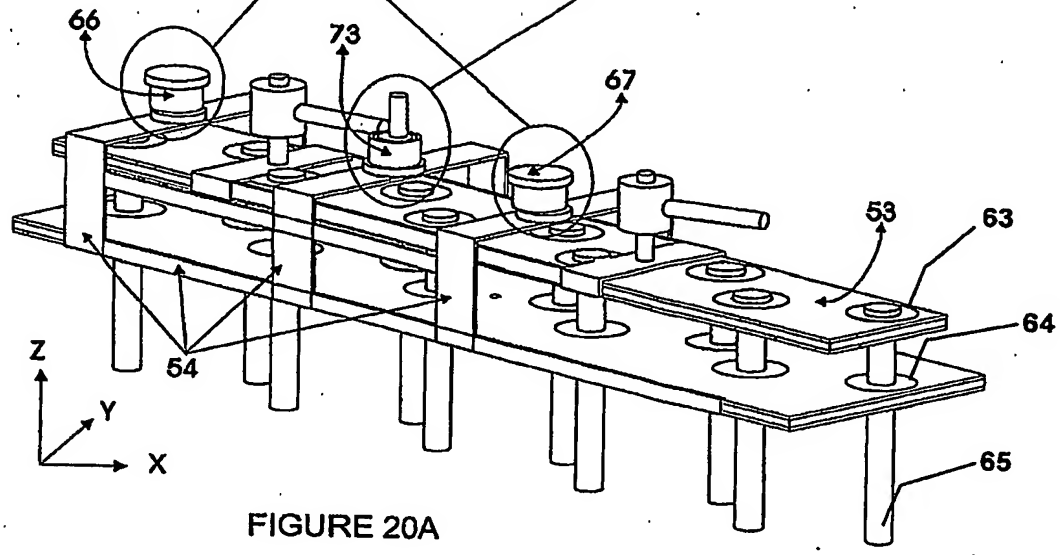

FIGURE 20A

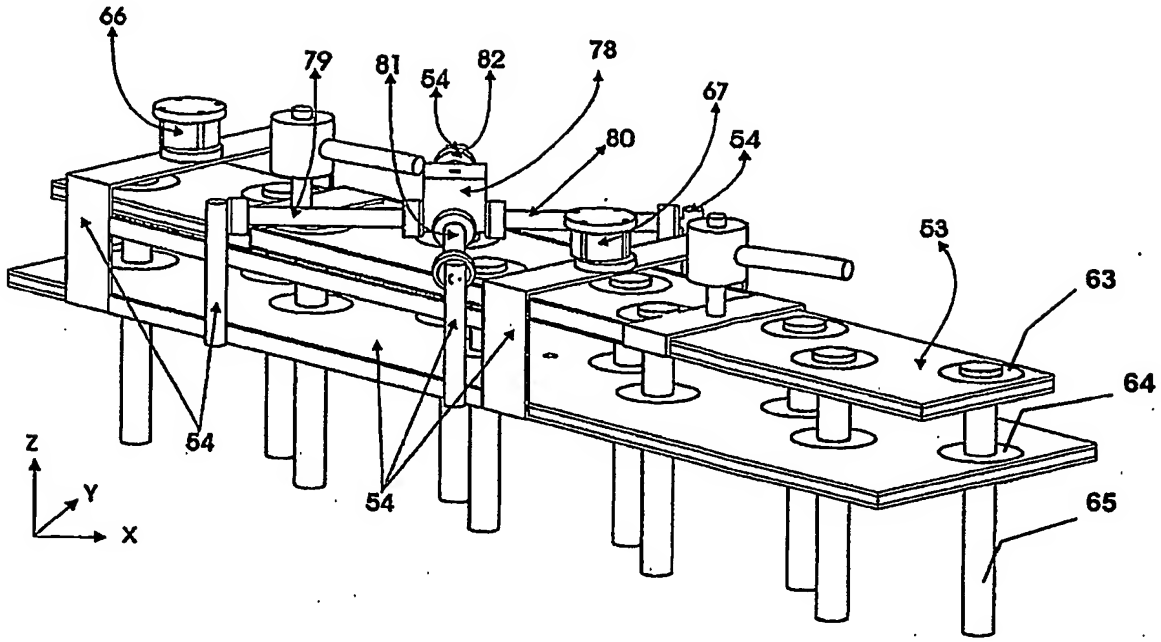

FIGURE 21

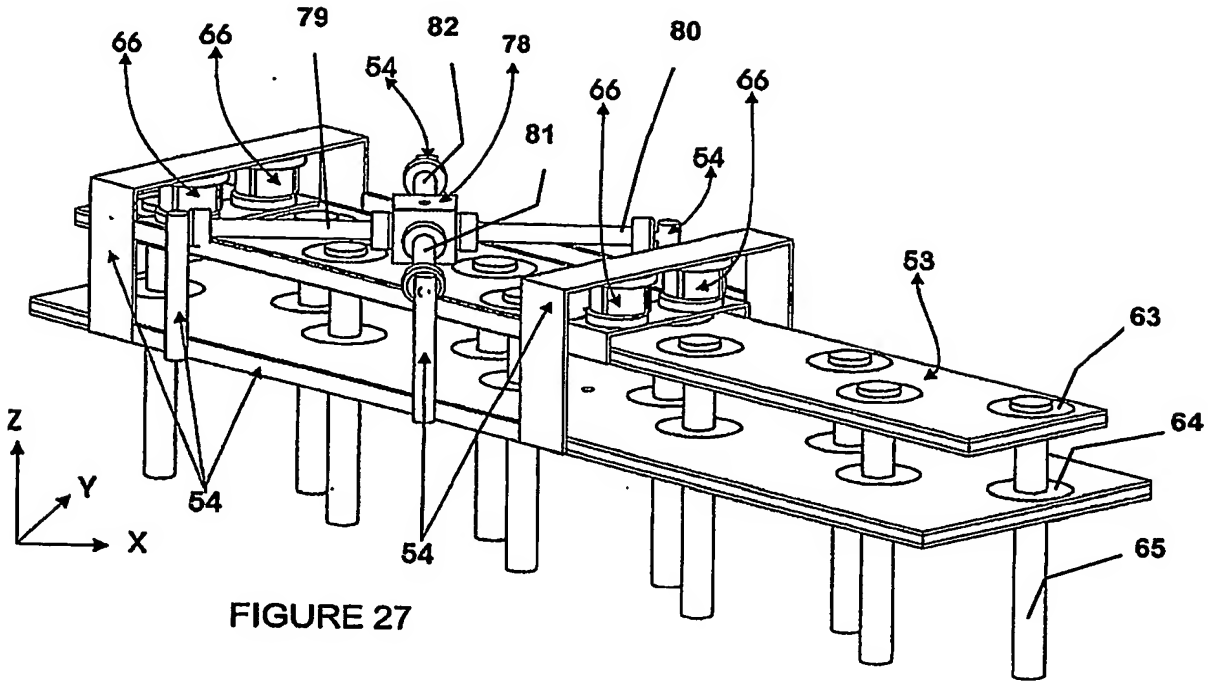

FIGURE 27

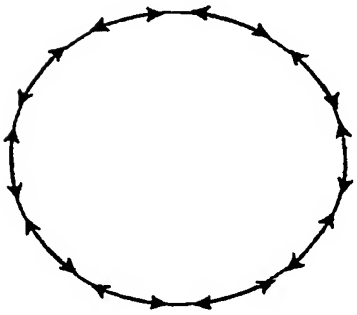

FIGURE 28a

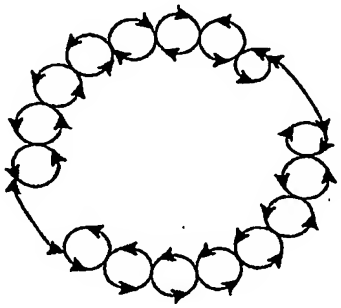

FIGURE 28b

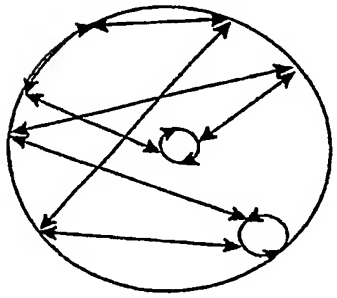

FIGURE 28c

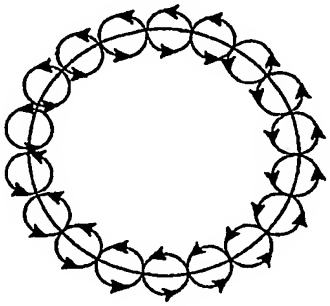

FIGURE 28d

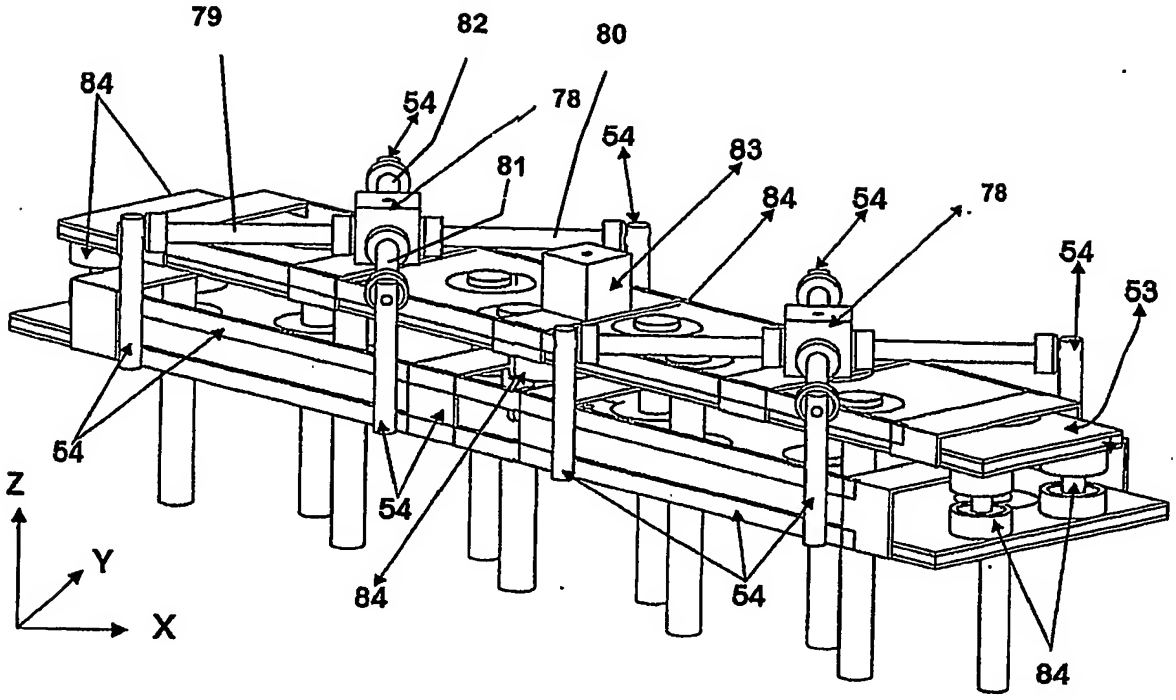

FIGURE 29